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## **\$113.7 MILLION**

NIH Funding at Vanderbilt in FY 2018

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## **\$22.4 MILLION**

National Institute of General Medical Sciences (NIGMS)

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## **\$14.4 MILLION**

National Cancer Institute (NCI)

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## **\$11.8 MILLION**

National Institute of Diabetes and Digestive and Kidney Disease (NIDDK)

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### **Vanderbilt signs licensing agreement to develop schizophrenia drug**

Vanderbilt University has signed separate licensing and research collaboration agreements with Lundbeck, a global pharmaceutical company based in Denmark, to develop a novel approach for treating schizophrenia. Under the terms of the licensing agreement, Lundbeck has exclusively licensed rights to compounds developed by the Vanderbilt Center for Neuroscience Drug Discovery (VCNDD) that act on a receptor in the brain that has been implicated in schizophrenia to produce an anti-psychotic-like effect and improve cognitive performance with low risk of side effects. The Vanderbilt compounds were developed with the support of the National Institute of Mental Health, part of NIH.

### **Vanderbilt Center for Addiction Research**

Founded in 2016 within the Basic Sciences of the Vanderbilt School of Medicine, the Vanderbilt Center for Addiction Research (VCAR) seeks to take advantage of new technologies to discover mechanisms by which addiction develops, and to use these discoveries to benefit society. NIH supports a variety of research at VCAR to help propel forward its three main goals; 1) to determine key molecular mechanisms that contribute to the most pernicious aspects of addiction; 2) to develop new strategies to treat addiction using the unparalleled drug development infrastructure at



*The same immune system that fights infection and the flu could join the battle against opioid addiction, new research out of VCAR indicates. (Photo: Vanderbilt University)*

Vanderbilt; and 3) to provide near-peer outreach strategies to educate teenagers on the incredible nature of their brain, and how it is uniquely vulnerable to opioids at their age.

A team from VCNDD has been working with VCAR to develop agents that will abolish the addictive effects of opioids without impacting their analgesic effects. They have discovered a protein receptor in the brain that is present in circuits that control the reward pathway. They have also discovered a drug-like molecule that binds to this receptor and blocks its function. The result is a compound that blocks the ability of opioids to stimulate reward circuits in the brain, but does not block the ability of opioids to relieve pain. This is a very exciting development that suggests that it is possible to prevent the addictive effects of opioids without diminishing their ability to relieve pain.

### **Characterizing 'keyhole' is first step to fighting obesity at cell level**

Pharmaceutical companies long have attempted to develop a small-molecule drug that could shut off hunger, which would have the potential to beat obesity at the cellular level. The problem has been that the receptor type that needs to be activated has not been well understood. They are essentially trying to design a key without knowing the shape of the keyhole. Researchers at Vanderbilt, with their international collaborators' and NIH's support, have characterized for the first time the receptor type that, when activated, shuts off hunger. Now that the researchers have characterized the keyhole in great detail,

pharmaceutical companies should be able to make progress in the drug discovery process.

## **Unraveling genetic mystery next step in Zika, dengue fight**

A Vanderbilt team took the next leap forward in using a little-known bacteria to stop the spread of deadly mosquito-borne viruses, such as Zika and dengue. The bacteria, *Wolbachia*, occur widely in insects and can inhibit certain pathogenic viruses the insects carry by hijacking the insect's reproductive system in a process called cytoplasmic incompatibility. The decades-old mystery of how this hijacking process works was solved by the Vanderbilt team. This discovery, supported by NIH, could allow the hijacking process to be harnessed to protect humans against disease transmission. The team has filed a patent application on this new finding.

## **Enzyme helps build motor that drives neuron death**

A biochemistry researcher at Vanderbilt, supported by NIH, set out to satisfy her curiosity about an enzyme present in the damaged neurons of people with multiple sclerosis and ended up making a leap toward a potential cure for countless neurodegenerative ills. She teamed up with a mechanical engineer and they found that if the enzyme, which is normally contained in one region of the cell, is triggered outside the region, then it triggers a reaction that kills the neuron. An element in that reaction has been implicated in Alzheimer's disease, ALS, traumatic brain injury, and other diseases or injuries to the nervous system.

## **Novel research explores way to restore silenced voices**

A transinstitutional research effort between the Vanderbilt Institute for Surgery and Engineering and Vanderbilt University Medical Center is using a five-year, \$2.4 million NIH research grant to design a software tool to help restore speech for people with vocal fold paralysis. The tool, based on a model previously created by the researchers linking cicadas' wing movements and humans' vocal folds, will help surgeons develop more precise plans for vocal fold surgery.

## **Binge drinking may cause heart risks**

Research at the Vanderbilt University School of Nursing, supported by NIH, has found that young adults who frequently binge drink were more likely to have specific cardiovascular risk factors, such as higher blood pressure, cholesterol, and blood sugar at a younger age than non-binge drinkers. The study also found differences in how binge drinking affected young men and women. Young men who reported that they repeatedly binge drink had higher systolic blood pressure and total cholesterol while young women who repeatedly binge drink had higher blood sugar levels compared to non-binge drinkers.

## **Looking beyond the 'magic bullet' approach to drug discovery**

Vanderbilt researchers in the chemistry and biology departments, with support from NIH, have developed a new process that can rapidly and inexpensively identify personalized cancer drugs derived from nature. They believe it's time to move beyond the traditional "magic bullet" approach for discovering new drugs and start leveraging the full complexity of Mother Nature. By performing the discovery process with multiple patient samples representing the various major genetic types of cancer, the molecules emerging from their pipeline could be developed for use in personalized therapeutics that are tailored to individual patients.

## **NICHD Learning Disabilities Innovation Hub**

In 2016, Peabody researchers received a grant for a Learning Disabilities Innovation Hub from NIH's Eunice Kennedy Shriver National Institute for Child Health and Human Development. In the Vanderbilt Learning Disabilities Hub, a transdisciplinary group of researchers is working to advance scientific knowledge about learning disabilities and their treatment and prevention. The Vanderbilt Hub is investigating learning disabilities that occur across reading comprehension and mathematics problem-solving and studying how oral language comprehension may provide a common pathway for explaining difficulty across both academic domains and a common lever for improving performance.